# Time Efficient Arterial Spin Labeling Imaging with Segmented Multiband-acquisition (20150097, Dr. Greg Metzger)

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# High-Resolution, Whole Brain Perfusion Imaging

Multi-band echo planar imaging (MB-EPI), a new approach to increase data acquisition efficiency and/or temporal resolution, can potentially overcome critical limitations of standard acquisition strategies for obtaining high-resolution, whole brain perfusion imaging using arterial spin labeling. While multiband may also introduce certain confounding effects, recent studies reveal that the amplified noise (given by the geometry factor, or g-factor) and the leakage contamination (assessed by the total leakage factor) have minimal impact on cerebral blood flow estimation. The studies demonstrated that compared to SB-EPI, MB-EPI improves highresolution, whole brain pCASL perfusion imaging in terms of improved spatial and temporal signal-to-noise ratio efficiency. Furthermore, it increases compliance with commonly used single blood compartment models, resulting in improved cerebral blood flow estimates.

## **Overcomes Traditional MB-EPI Limitations , Improves SNR Efficiencies**

This MB-EPI arterial spin labeling imaging acquisition strategy overcomes limitations of traditional MB-EPI for pCASL and further improves SNR efficiencies of MB-EPI arterial spin labeling imaging. Compared to single MB-EPI acquisition for whole brain imaging, this approach can provide extra benefits for arterial spin labeling imaging by:

- 1. further boosting spatial and temporal perfusion SNR efficiencies,
- 2. reducing imaging time, and/or
- 3. eliminating (or further minimizing) leakage contamination levels, therefore increasing temporal SNR efficiency.

The most significant difference is that segmented MB readouts will be applied for arterial spin labeling imaging for the inferior, middle and superior brain regions, instead of a single MB readout.

## **BENEFITS AND FEATURES:**

- Minimal impact on cerebral blood flow estimation
- Improved spatial and temporal signal-to-noise ratio efficiency
- Increases data acquisition efficiency and/or temporal resolution
- High-resolution whole brain pCASL perfusion imaging
- Improved cerebral blood flow estimates
- MB readouts applied for arterial spin labeling imaging for inferior, middle and superior brain regions

#### **APPLICATIONS:**

# Technology ID 20150097

#### Category

Engineering & Physical Sciences/MRI & Spectroscopy Life Sciences/Diagnostics & Imaging Life Sciences/Human Health Life Sciences/Medical Devices Life Sciences/MRI & Spectroscopy Software & IT/Algorithms Agriculture & Veterinary/Veterinary Medicine

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- Brain imaging
- High-resolution whole brain pCASL perfusion imaging
- spin labeling imaging methods (e.g., FAIR and VS-ASL)
- Neuroscience research
- Clinical applications

#### Phase of Development - Prototype developed

#### Researchers

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#### Publications

Theoretical and experimental evaluation of multi-band EPI for high-resolution whole brain pCASL Imaging NeuroImage, Volume 106, 1 February 2015, Pages 170-181

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